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JPRS: 18,184

OTS: 63-21347

18 March 1963

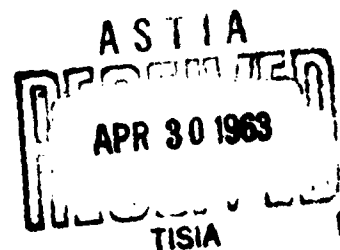
AD No. 405226

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USSR Industrial Development

SOVIET FERROUS METALLURGY

No. 103



U. S. DEPARTMENT OF COMMERCE  
OFFICE OF TECHNICAL SERVICES  
JOINT PUBLICATIONS RESEARCH SERVICE  
Building T-30  
Ohio Dr. and Independence Ave., S.W.  
Washington 25, D. C.

Price: \$1.00

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USSR Industrial Development

SOVIET FERROUS METALLURGY

No 703

This serial publication contains translations on ferrous metallurgy in the Soviet Union, on the specific subjects indicated in the table of contents. Complete bibliographic information accompanies each article.

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## EXPLOITING THE POTENTIAL AT THE DNEPROSPETSSTAL' PLANT

[Following is a translation of an article by B. Sergeyev in the Russian-language periodical Metallurg (The Metallurgist), Moscow, No 12, Dec 1962, pp 29-30.] *ok*

[v. 7]

The personnel of one of the nation's largest enterprises -- the Dneprospetsstal' Electrometallurgical Plant, has accomplished a great deal to maximize the production of metal within the existing production space. Between 1959 and mid-1962 alone, this personnel increased gross output more than 1.9 times and marketable output nearly 1.8 times; during the same period steel output increased by 63.8 percent, and rolled stock output by 19.9 percent. The income of the plant has doubled. Labor productivity in the first half of 1962 alone, compared with the first half of 1961, increased by 10.5 percent.

The Dneprospetsstal' workers have also considerably improved their other technical-economic indexes. Their accomplishments are impressive. But can it be said that they have done everything to exploit production potential? Of course not!

The further expansion of the production of metal for the needs of the national economy hinges both on the Dneprospetsstal' workers themselves and on the higher authorities, meaning primarily the Ukrainian Sovnarkhoz and the Gosplan Ukrainian SSR.

Herewith are a few examples.

In recent years, due to shortcomings in planning, the Dneprospetsstal' Plant has found itself in a situation in which its production of electric steel is far greater than its metal-rolling capacity. In other words, the plant has

a surplus of some 25 to 30 percent of ingot steel over and above its rolling capacity. It would seem that in such a situation the republic organizations should provide the plant with immediate assistance in modernizing and expanding its rolling facilities so that the entire amount of the ingots produced in the plant could be processed in situ. The more so as at the rolling shop it was feasible to expand the section mills, provided that they are supplied with a sufficient amount of billets. This, however, required modernizing the "825" roughing mill. But this type of assistance, precisely, has not so far been provided to the plant. True, initially the Gosplan Ukrainian SSR planned the modernization of this mill for 1961, but later it was indefinitely postponed.

Thus a situation arose in which the Dneprospetsstal' has been sending its ingots to different enterprises while at the same time receiving billets for its sectional mills from other metallurgical plants. But since these outside billets are of a metal of conventional rather than of high and super-high quality, the plant cannot expand appreciably its output of high-quality rolled stock. Moreover, the processing of conventional metal from outside billets at the section plants is unprofitable to the plant. Then there is also the high cost to the State of the hauls of ingots from the Dneprospetsstal' Plant to all four corners of the country and of the hauls of billets to this plant from the other plants.

However, neither the Gosplan Ukrainian SSR nor the Ukrainian Sovnarkhoz are concerned with calculating the high cost of such planning. How else can we explain the fact that these organizations rescheduled the modernization of the "825" mill for the end of 1963, to be completed in 1964?

The growth of the Dneprospetsstal' Plant in recent years has been marked by emphasis on the expansion of basic production facilities while at the same time paying nearly no attention at all to the expansion of auxiliary facilities. Currently, the effects are beginning to be tangible. The repair facilities at the plant do not cope with their tasks: the further growth of production is being hampered by the low capacity of auxiliary and service shops -- the retreat, electrical, control and measuring instruments and automation, cutting-out and stripping, and other shops. The elimination of all these bottlenecks would enable the personnel of this plant to produce an additional tens of thousands of tons of steel and rolled stock in excess of the plan.

Substantial assistance to this plant should be provided by the Zaporozhskiy and Ukrainian sovnarkhozes.

Speaking of the internal potential whose exploitation depends entirely and totally on the personnel itself of the Dneprospetsstal' Plant, recently this personnel evaluated the results of its competition with the personnel of the Elektrostal' Plant. This competition has been under way for 25 years. There has been a great deal of exchange of useful experience and advanced know-how between both collectives an exchange that also results in improvements and introduction into production.

The survey of this competition showed that the Elektrostal' workers lead in a large number of technical-economic indexes. For example, at the Elektrostal' Plant the unit electric power consumption per ton of steel is 8.5 to 10.0 percent lower than at the Dneprospetsstal'.

What is the explanation for these accomplishments of the Elektrostal' Plant workers? Primarily, the reduction of furnace stoppages and the resulting savings of furnace heat. If we compare the electric-furnace stoppages in the last four years at the mutually competing shops, the picture will be as follows: at the electric steel smelting shop No 1 of the Dneprospetsstal' Plant these stoppages on the average have been one and one-half times greater than at the electric steel smelting shop No 1 of the Elektrostal' Plant. At the electric steel smelting shop No 2 of the Dneprospetsstal' these stoppages have averaged 10.0 percent higher.

These data attest that the Elektrostal' workers operate their electric furnaces more efficiently than do the Dneprospetsstal' workers. Moreover [sic], the working conditions at the Dneprospetsstal' are far better than at its sister plant near Moscow.

Let us now consider another index of electric-furnace performance -- daily steel output per 1,000 kilovolt-amperes of transformer rating. At the Elektrostal' Plant (electric steel smelting shop No 1), in the last four years, this index averaged 18.9 to 19.4 tons, whereas at the Dneprospetsstal', in the corresponding shop, it averaged only 12.0 to 13.8 tons.

Thus, we see that at shop No 1 of the Dneprospetsstal' Plant, despite its more powerful furnaces and transformers,



the daily steel output per 1,000 kilovolt-amperes of transformer rating was 40 to 50 percent lower. Were the personnel of this shop to match the index achieved in this respect by the analogous shop at the Elektrostal' Plant, it would produce more than one thousand tons of steel in excess of the plan.

The reduction of smelting time constitutes a tremendous potential for increasing steel output.

To illustrate, we will compare the indexes of average smelting time for the last four years in two electric steel smelting shops of both plants.

Thus while at the electric steel smelting shop No 2 of Elektrostal' the duration per melt averaged 4.3 to 4.5 hours, at the corresponding shop No 2 of the Dneprospetsstal' it has averaged 5.3 to 6.1 hours in recent years, that is, 24 to 35 percent longer.

Can this be explained solely by the fact that at the Dneprospetsstal' the furnace space is somewhat larger than at the Elektrostal'? Of course not. An analysis of the performance of these furnaces shows that the long smelting time is mainly attributable to organizational drawbacks.

The cutting of the production cost of steel is greatly affected by the rate of the consumption of metal charge, fritting materials, and replaceable equipment per ton of steel. Let us compare these indexes for both plants (also for the last four years).

At the electric steel smelting shop No 1 of the Dneprospetsstal' Plant the consumption of metal charge per ton of acceptable steel has averaged 1,121.6 to 1,134.6 tons, whereas at the corresponding shop of the Elektrostal' Plant it was 1,108 to 1,112 tons, that is, 13 to 22 kilograms less.

A similar situation applies to the rate of consumption of replaceable equipment, especially ingot molds. Thus, at the electric steel smelting shop of the Dneprospetsstal' the consumption of these molds per ton of steel in the last four years has been 1.4 times as high as at the same shop at the Elektrostal'.

These examples show that the Elektrostal' Plant pays more attention to the preparation of production and operation of equipment, thereby enabling its workers to achieve

higher technical-economic indexes. The Dneprospetsstal' workers should emulate more energetically this experience of their Dneprospetsstal' comrades, and introduce it more rapidly at their own plant.

The Dneprospetsstal' Plant also utilizes far from ideally its other production potential, particularly the maximally fast introduction of new equipment and techniques. Thus, its shop No 1 has installed but still not mastered an installation for the electric heating of ingot heads, whereas at the corresponding shop at the Elektrostal' Plant this process is extensively employed. As a result, the Elektrostal' people have not only improved the quality of ingots but also saved metal in the process shops due to the increase of six to eight percent in the yield of acceptable metal.

The Dneprospetsstal' workers a few years ago were the first in this country to introduce split electric-furnace frames, which accelerated the conduct of cold repair and eased the labor of the repairmen. Since then the duration of cold repair has shrunk nearly in half. However, this experience has not been copied in every electric steel smelting shop. And yet now split frames are being used not only in other metallurgical plants of this country but also abroad.

The Dneprospetsstal' workers have accomplished a great deal of mechanization of labor-consuming production processes in their shops. However, by now their past accomplishments are no longer satisfactory. So far a majority of metal trimming operations has continued to be performed manually, although this exactly is the greatest potential source for increasing labor productivity at this plant.

At the Dneprospetsstal' Plant there is a tremendous potential and extensive opportunities for further increasing the production of steel and rolled stock and improving the technical-economic indexes. The task is to exploit this potential as soon as possible; this will assure the further growth in the production of metal at this plant.

## HIGH-STRENGTH ALLOYS FOR TURBINE BUILDING

[Following is a translation of an article by I. Bogachev, Professor, Doctor of Engineering, Recipient of the State Award; Director, Metallurgical Experimental Laboratory, Ural Polytechnical Institute, in the Russian-language periodical Metallurg (The Metallurgist), Moscow, No 12, December 1962, pp 29-30.]

*citation incorrect  
not in no 12  
3.12.1962 - 10.12.1962*

...A major role in the development of turbine building should be occupied by new materials -- cavitation-resistant alloys.

The most promising in water turbine building are the steels of the so-called austenitic class. However, only one of the large number of grades of these steels is used, and its selection cannot be said to be felicitous, at that. This is the expensive stainless chrome-nickel steel with nine percent nickel. It resists micro-impact poorly, and it rapidly disintegrates when subjected to a strong cavitation effect.

The lack of highly cavitation-resistant alloys impedes the development of economically operating and durable water turbine designs. Nevertheless, so far no scientifically based criterion of the resistance of metal to micro-impact effect has been proposed. The concepts of the mechanism of the disintegration of metal and alloys exposed to micro-impact effect also are in a rudimentary stage.

In our research we examined not the particular problems of increasing the cavitation resistance of some one alloy or steel but the general problem as a whole. Here of primary importance are the plastic deformation and structural transformations in the surface layers of metal upon cavitation. Investigating these processes, scientists from the Ural Polytechnic Institute imeri Kirov developed a principle for selection of materials resistant to the micro-impact and, especially, cavitational effects. This principle is essentially that micro-impacts should result in

the self-hardening of the metal surface. The longtime labor of our investigators led to the development of metal alloys with a much higher resistance than that of the materials being currently used in hydraulic machine building, shipbuilding, and other branches of machine building.

Scientists have developed up to the industrial-test stage a new grade of austenitic chromium-manganese steel with a cavitation resistance three to five times as high as that of conventional chromium-nickel steel. The broad use of this new material will make it possible not only to considerably increase the service life of machine parts, especially water turbine parts, but also to relieve a large quantity of chrome-nickel steel.

As is known, cast iron also is used in the production of water turbines and hydraulic pumps. Another result of research performed at our laboratory has been the development of a new grade of cast iron with spheroidal graphite that is two to three times as cavitation-resistant as gray cast iron. To broadly propagate the experience in using this iron in pump buildings, an experimental water-supply station equipped exclusively with pumps made of the new grade of iron will be established in the immediate future.

Currently in the offing is a number of measures to carry out extensive scientific and design-experimental work to use new cavitation-materials in the machine building industry. New grades of steel are to be used in water turbine building and in the construction of various pumps as well as of the propeller screws of fast ships. The broad industrial introduction of new materials will make it possible to improve the design of many machines, increase their speeds and prolong their service life, and save substantial financial and material assets.

Responding to the decisions of the November Plenum of the CC CPSU, the Soviet scientists are applying every effort to place in the service of the nation the new remarkable achievements of science and engineering.

## AT THE CHEREPOVETS METALLURGICAL PLANT

[Following is a translation of an article by A. Borodulin, Director, Cherepovets Metallurgical Plant, in the Russian-language newspaper Ekonomicheskaya Gazeta (Economic Gazette), Moscow, No 49, 1 Dec 62, p.8.]

For several years now Cherepovets, located, as it were, at the apex of an angle where intersect the trunk railroad lines running from the Kola Peninsula and the Pechora Coal Basin, has been attracting "pilgrims" from among the Soviet and foreign metallurgists. They have been coming here to explore this handsome plant which has arisen on the bank of the Sheksna, to meet the remarkable workers of the pyrometallurgical shop. By now the Cherepovets Plant strikes the connoisseurs by its appearance, layout, and innovation, and in the not distant future it will doubtless become the pride of the domestic ferrous metallurgy.

Conceived as a planned-loss enterprise with a comparatively small volume of steel production, this plant, due to timely revisions of its original project on the initiative of the Party CC and Council of Ministers USSR, will become a huge metal supplier and will yield to the State approximately 80 million rubles in profits annually.

This was a wise and farsighted decision. The new tasks and prospects inspired the personnel of the plant with renewed zeal. It is one thing to know that no matter how hard you work, the results will not be profitable and you will remain a dependent of the State Treasury. It is another thing to face a great and concrete goal and to work, venture, and create in the name of this goal.

The first step on this new path has already been made: the Cherepovets metallurgists currently are providing

services which cost the State less than at the Novo-Tula, Servo, Orsk-Khalilovo, and many other Soviet ferrous-metal-lurgy combines and plants. In the present year, the first time in its existence, the Cherepovets Plant is operating at a profit. The previous assertions that this plant is incapable of producing low-cost metal have been proved to be completely unfounded.

And as for quality, that is, as for purity and the content of harmful impurities, the Cherepovets pig iron is known to have no rivals on the domestic as well as international market. Not for nothing the machine builders insist on using Cherepovets-made pig iron, and they say in such cases, the demand definitely exceeds the supply.

The struggle to increase output in all ways, and to steadily cut production cost, is primarily a struggle to utilize most efficiently the available capacity. Now as regards such a young and still uncompleted plant as the Cherepovets, this is moreover a struggle to attain the full designed capacity as soon as possible.

The blast furnace shop of the Cherepovets Metallurgical Plant is the very latest to have been built in the USSR, but its personnel has already achieved high indexes of furnace performance. In the first half of 1962 the volumetric efficiency of furnaces at this shop averaged 0.508 and the consumption of coke -- 566 kilograms per ton of basic pig iron. The personnel of the shop is working persistently to improve the control of blast-furnace operations; here the instrument recording could serve as a potent tool for investigating the "ideal" blast furnace process.

Our blast-furnacemen are also making notable accomplishments in mastering the recently activated giant blast furnace: it now produces approximately as much pig iron as do two of its sisters, each with the same volume at Lipetsk and at Tula. It is not accidental that the low rate of achieving the full designed capacity of these blast furnaces, which are of the same type as our giant furnace, has been sharply criticized in the press. The Soviet people do not and shall not tolerate the slow recoupment of the considerable State funds invested in capital construction, in the production of new equipment.

The new blast furnaces are not only giants that individually produce unprecedented quantities of pig iron unmatched anywhere else in the world. They are also very

efficient furnaces which, upon proper operation and upon charging with proper raw materials, assure excellent technical-economic indexes. In particular, the Cherepovets blast-furnacemen set themselves the goal of achieving a volumetric efficiency of 0.45 to 0.40 at their new giant blast furnace within the next few years. Such a volumetric efficiency index had not even been anticipated by the designers.

However, this depends not only on the blast-furnacemen but also on the suppliers of iron-ore concentrate which is part of the furnace burden. The Olenegorsk and Kovdor mines, which supply this concentrate to the Cherepovets blast furnaces, are expected to increase its iron content to 65 to 66 percent. Elementary calculations show that at the concentrator factory the elimination of one percent of silica from the ore costs six to seven times less than at the blast furnace. The expenditures on completing the construction of the Olenegorsk Concentrator Factory will be recouped within a mere year through the more productive performance of the blast furnace shop of the Cherepovets Plant. So we are astounded by the stubbornness with which the planning organs refuse to assign the necessary funds, although the high effectiveness of capital investments of this kind is obvious and indisputable.

Moreover, the current planning of concentrate production does not stimulate the concentrators to increase the percentage of iron content. The plans for the mines are assigned in terms of tonnage. The more tons, the easier the plan is fulfilled. But after all the important thing is the iron content of the concentrate -- and under such planning this important thing is as it were shouldered aside. Thereby the national economy is caused triple detriment: silicon has to be eliminated in the process of blast furnace smelting, in other words, at three times the normal cost; this reduces the furnace productivity; and moreover silicon has thus to be unproductively transported by rail over 1,500 kilometers.

We recall a conversation which we, a team of Soviet specialists visiting the "Eisen Erz" Mine in Austria, had with the administrators of the metallurgical plant standing in the immediate neighborhood of this mine. We inquired why this plant, which controls the extraction of the "Eisen Erz" Mine, takes for itself the poorer ore while sending the richer ore to another plant, which lies 65 kilometers away from the mine. The reply was: "Why should gangue be carried so far?"

In our country, however, this argument is not always heeded, unfortunately. This is exemplified by the transportation of Olenegorsk silica to Cherepovets. In recent years, moreover, Kuznetsk Basin has been receiving from Magnitka, over a distance of 2,000 kilometers, hauls of low-grade iron ore from local dumps.

The Cherepovets Plant is an enterprise with a complete metallurgical cycle. The final yardstick of the labor of its personnel is the volume of output of rolled stock -- sections and sheets. It is exactly in this field that the personnel of this plant faces the most responsible tasks, tasks to which the plans of the expansion and maximally rapid mastering of facilities have been adjusted. But the organizational aspect of this matter still continues to leave much to be desired.

In recent years the organization of construction at our plant has become unusually complicated. This construction is being performed by various design institutions, by the customer, by the prime contractor -- a trust subordinated to the sovnarkhoz, and by the subcontractors, organizations within the framework of the ministry of construction of this republic, and they all continually dispute, blame one another for various omissions, involve higher authorities in their disputes, and thus waste the most precious thing -- time. And once the construction of a facility is over, the so-called adjustments follow; they are financed with funds assigned for operating the new facility, and they also are performed by the specialized construction organizations although, candidly speaking, the "adjustment," as a rule, is reduced to eliminating minor drawbacks and oversights committed during the installation of the equipment.

To us the construction of the industrial giants represented by the contemporary metallurgical enterprises has always been a national cause. Suffice it to recall how we built the Magnitogorsk Plant and the Kuznetsk Combine. This had taken place, so to speak, at the dawn of our industrial maturity; the coeval construction techniques simply bear no comparison with our present-day construction industry. But nevertheless, within two and one-half to three years after the Magnitogorsk and Kuznetsk projects were begun, the country already had started to receive their pig iron.



A contemporary metallurgical plant is a vast complex of large and intricate structures costing a total of approximately 600 to 700 million rubles. Of these, 350 to 400 million are usually expended on construction and installation operations. In order not to delay the implementation of such large investments and in order to derive profit from them more rapidly, a formidable and well-equipped construction organization is required.

Now, the trusts that handle the construction of new metallurgical plants have the capability and facilities for completing projects of this kind within, at best, eight to ten years. This is twice the normal period of construction of projects of this kind. For example, the West Siberian Metallurgical Plant has now been under construction for more than six years, but so far not one of its facilities has been put into operation. A great deal of capital investments has thus been immobilized. Is not this example food for thought?

Another illustration of unjustifiably protracted construction could be the Cherepovets Plant. How this affects the economics of production is indicated by the following examples from this year's practice. As of the second quarter the plant was assigned a higher pig iron output plan, because a new blast furnace was scheduled to start operating by then. But it started to produce its first pig iron only as late as on 16 July. Since May our steel production target was raised: it was assumed that a new open-hearth furnace would start operating as of this month. However, this furnace could not be activated earlier than on 18 August. As of the third quarter we were assigned a higher coke production target, but the construction of new coke ovens has been delayed and will not be completed until next year, and now literally the entire plant is being hit by the consequences of this postponement. Such mistakes have caused the plant to underfulfill its plans of marketable output for the second and third quarters.

As envisaged by the November Plenum of the Party CC, the reorganization of the Gosstroy USSR, the subordination thereto of the design and scientific-research institutions working in the field of construction, the separation of construction organizations from the jurisdiction of the sovnarkhozes, and the establishment in the republics and economic administrative regions of independent construction organizations toward which the sovnarkhozes would stand in the relation of clients only, will lead to radical improvements

in the entire business of capital construction. Indisputably this will also affect favorably the rate of construction of metallurgical enterprises and the schedule for activating their new capacities.

Practice has shown that the Soviet metallurgists know how to "squeeze out" of the equipment entrusted to them results that surpass even those postulated in the projects. This could be exemplified, in particular, by the Magnitogorsk blast-furnacemen, who, despite the huge volume of production, have always been working smoothly and courageously blazing new trails for technical progress in blast furnace operations, teaching others, and themselves constantly learning from the pace-setters.

Or take the blooming mill at the Kuznetsk Combine. Its "birthdate" was in 1930. Quite a few authoritative persons asserted that the potential of this unit was completely exploited, that it could not produce any more than it was doing -- due to considerations of the safety factor. But the personnel of this mill, creatively tapping every potential, even savings of seconds of time, succeeded, contrary to these "authorities," in achieving the seemingly impossible. This Kuznetsk blooming mill leads in productivity all the other blooming mills of the world!!

Instances of this kind are not rare. So why is it then, one might ask, that many of the recently completed projects have not been yielding the expected results and sometimes even have been operating with inferior technical-economic indexes as compared to their much older predecessors?

Here, it seems to us, a few words need be said about the quality of design documents -- more exactly, about the heeding by the designers of their own labor.

We the Cherepovets metallurgists believe, for example, that the Giprokoks [State Institute for Design and Planning of Coke Industry Establishments] shows the proper attitude towards its purpose. The staff of this Khar'kov-sited institute keeps track of the activities of the coke-chemical shops it has designed, takes the trouble to improve the technical-economic indexes of the equipment built according to its designs.

But this cannot be said of the activity of another major institute -- the Leningrad Branch of the Mekhanobr [Scientific Research Institute for Mechanical Concentration

of Minerals]. The sintering factory which it has designed for our plant has from the very first days of its operation been a kind of guinea pig: the vibration feeders were replaced by tray feeders and the self-balancing screens by screens of a new type. All in all, more than 200,000 rubles of equipment was discarded from this factory which has just started operating!

Of course, everything can and should be improved -- this is required by implacable time. But if the designers were from the very beginning to consider critically the technical solutions they adopt, snafus of this kind surely would not recur. Whereas the revision of projects that have already been initiated or, worse still, put into operation, promises no good!

Indicative in this respect is the story of the Cherepovets blooming mill. Its full designed capacity has not yet been reached, in our opinion, due to oversights by the designers. This has also been affected by the incomplete state of construction itself of this mill, as well as by some lag in steel production at the plant. Our rolling-mill workers are convinced that in the not distant future they will succeed in not only attaining but also surpassing the full designed capacity of this mill.

But now, instead of commencing the originally planned construction of a second blooming mill, contrary to the opinion of specialists at the plant, it is being decided to modernize the first mill (although, as noted above, its construction still has not been completed and its true output capacity has not yet been completely determined). Moreover, this very costly modernization would nevertheless not make the blooming mill sufficiently powerful to process all of the open-hearth steel that will be produced at our plant.

Hence the following proposal: the modernization of equipment whose full designed capacity is not yet attained should be categorically prohibited.

The recently ended plenum of the Party CC has outlined the ways for a still more strenuous uplift of the Soviet economy, for further improving the Party and administrative management of the national economy. There is no doubt whatever that the concerted and persistent struggle of the Soviet people to translate into reality the decisions of this plenum, the improvement in the practices of production

planning, and the organizational reforms in industrial construction and its design, will make it possible to expend capital investments much more effectively, to utilize new capacities more efficiently, and to create more rapidly the material-technical base of communism.

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## PRODUCTION AT THE KAZAKH METALLURGICAL PLANT

[Following is a translation of an article by T. Bekenov in the Russian-language newspaper Ekonomicheskaya Gazeta (Economic Gazette), Moscow, No 49, 1 Dec 62, p 9.]

Our plant was built during the war and therefore its facilities are inferior to those of the modern enterprises of its kind. But this does not mean that our technical-economic indexes are bad. Within a short period of time and at comparatively low capital investments our personnel has achieved a considerable increase in the output of steel and marketable rolled stock. The full designed capacity of the open-hearth shop was exceeded more than two times by the end of 1961, and the production of rolled stock during the same period had been tripled.

A fine feat of labor was accomplished by our personnel in honor of the November Plenum of the CC CPSU. On 16 November the 11-month program of rolled stock production was fulfilled. The plant has fulfilled its nine-month plan 108.9 percent, producing thousands of steel and rolled stock in excess of the plan. On the basis of its performance during the third quarter, our personnel was awarded the challenge Red Banner of the Council of Ministers Kazakh SSR and the republic council of trade unions.

Gross output per worker at our plant has risen nearly 36 percent since 1958. As of 1960 the plant has been operating profitably. The expenditures per ruble of marketable output have been cut to 96.3 kopecks. Thus we have outdistanced the Uzbek Metallurgical Plant, with which we have been vying since 1947.

In the last four years the yield of steel per square meter of furnace area has increased by 800 kilograms and

the duration of one melt has been reduced by 48 minutes. It should be noted that these indexes are higher than at such plants as the Transcaucasian, Yenakiyevka, Donetsk, Chelyabinsk, and Moscow Serp i Molot. But still our plant has not attained the results attained by the Petrovo-Zabaykal'skiy and Chusovoy plants.

We are making this comparison purposely. The Party unit at the Kazakh Metallurgical Plant insistently demands of its managers that they investigate carefully the experience of sister enterprises. This helps to correctly assess the production successes and to find more efficient ways of eliminating the shortcomings.

Impressive results were registered at the open-hearth shop. Last year it was the third highest of shops of this kind in this country as regards the unit fuel consumption per ton of steel. The national average was 234 kilograms whereas at our shop it was less than 200 kilograms. As for the over-all open-hearth furnace stoppages -- cold and hot -- they have remained virtually constant at the level of 9.2 percent. These stoppages are definitely sizable, although they are smaller than at certain other plants. The Party Committee has analyzed the reasons for the prolonged cold stoppages and drafted measures to eliminate them. To reduce the duration of hot repairs of open-hearth furnaces, the operators began to successfully employ the progressive hearth fritting method developed at the Metallurgical Plant imeni Serov.

Much was accomplished to modernize the open-hearth shop. Early in the year a new open-hearth furnace was put into operation. It proved to be better and more economical than its older counterparts. Therefore it was decided to convert to the same type all the other open-hearth furnaces by the year 1965, and also to mechanize the labor-consuming processes by then. All this will make it possible to increase steel output by tens of thousands of tons annually and to save large quantities of firebrick.

Our annual output of rolled stock also has been rising. In the first half of the present year it increased by 22.7 percent as compared with 1958. As is known, the chief index of performance of a rolling mill is hourly productivity. The productivity of our "400" mill is higher than that of the "450" mill at the Serp i Molot Plant, the "500/400" mill at the Gur'yevskiy Metallurgical Plant, and at a large number of other enterprises.

For all that, however, our current stoppages are still considerable. The Party committee, with the aid of volunteer economists, has analyzed the reasons for the spotty performance of the rolling mill.

The furnaces of the "400" and "280" mills and the sheet-bar and annealing furnaces of the sheet mill were converted to fuel oil firing. This resulted in higher output of marketable rolled stock and improved working conditions at the shop, and made it possible to transfer 70 persons to other operations.

In addition, centralized heavy lubrication was introduced in the basic and auxiliary rolling-mill equipment. The resistance of the equipment increased and its stoppages decreased. Having solved these problems, the Party organization mobilized the personnel to increase the productivity of the cogging line. On investigating the experience of the Dneprodzerzhinsk Metallurgical Plant we succeeded in modernizing this line and thus sharply raising its productivity.

The increased demand for small, medium, and large rolled sections has necessitated a signal expansion of this production at the plant. This forced our Party organization to consider seriously improving the section mills. As a team from the Gipromez has concluded, their productivity could be doubled.

In the sphere of material production there is a highly important index of the ability of the personnel of the plant to husband the raw and other materials, equipment, and human labor. This index is production cost. It reflects like a mirror the entire many-sided activity of the production personnel, the economic results of performance of all the shops and services. And therefore the struggle to reduce production cost should be collective.

The skillful organization of this struggle at our plant has been paying off. Thus, the production cost per ton of steel has already dropped to 45 rubles 39 kopecks whereas at the Revda Plant, for example, it is 48 rubles, and at the Amurstal' 51 rubles 84 kopecks. However, in this index we lag behind the Sulinskiy, Petrovsk-Zabaykal'skiy, and Severskiy plants, let alone the Magnitogorsk and Novo-Kuznetsk combines.

Comparing these indexes and analyzing the ways of improving them, found at the leading enterprises, the Party organization strives to introduce advanced know-how at our plant.

The struggle to cut production cost at the plant has become general. Since 1959 the plan-exceeding savings have totalled 802,000 rubles.

The Party members at the plant are clearly aware that a successful solution of the complex tasks of technical progress requires the continual improvements of the forms and methods of organizing and educating work. The Party committee and its commissions constantly keep track of the course of modernization, growth of production, and the dynamics of the basic technical-economic indexes. Many of the Party activists exhibit great persistence in uncovering the production potential, eliminating the shortcomings.

The plant Party commission of control over the introduction of new equipment has promptly discovered the obstacles to the mechanization of various processes and helped to eliminate them. As a result, the six months' plan of introduction of new equipment at the plant was greatly overfulfilled. Another plant-wide commission, the commission of control over the reduction in the cost and improvement in the quality of production, investigated the situation at the "280" mill when it looked like the plan might not be fulfilled there. The commission's conclusions were discussed by the shop Party bureau. The operative measures adopted helped to overfulfill the task and produce an additional hundreds of tons of rolled stock.

It must be admitted, however, that the Party committee still has not caused all of the newly established commissions to be sufficiently vigorous. Some of them operate dispiritedly, and not infrequently close their eyes to instances of hebetude, routinism, and mismanagement.

The Party committee pays great attention to the permanent production conference at the plant. Its role in fostering technical progress is steadily growing. The conference regularly considers problems of improving the organization of labor, mechanizing production, cutting production cost. And the Party organization strives to promptly translate into reality the recommendations of the conference.



Production innovators give increasingly active assistance to the plant in solving various technical problems. They closely cooperate with the production-technical council. The council discusses and adopts the most important suggestions of the rationalizers.

In addition the Party organization strives to subordinate its work to elevate the political, economic, and technical knowledge of the workers of the plant to the task of successfully solving the tasks of a fuller utilization of fixed assets and acceleration of technical progress.

Six hundred persons study specific economics at 20 economic schools. Two specific economics seminars have been organized for foremen, brigade leaders, and shift chiefs, and one seminar on the analysis of economic activity -- for the managerial personnel of the shops and enterprise.

An important place in the Party's management of the activities is occupied by propaganda and the introduction of advanced technical and scientific know-how. Here the initiative entirely belongs to the shop collectives. They draft their own recommendations which are later discussed by the technical council of the plant and approved by the chief engineer. The control is carried out by the public.

Last year there was a well-organized study of the working techniques of senior casting-pit operator K. Fulidi. This school was managed by the senior casting-bay foreman A. Chumak and research engineer V. Lipatov. Due to the training of all casting-pit brigades in advanced working techniques, the indexes of the casting bay improved, the defects diminished, and the labor productivity increased by 2.9 percent.

In the present year, thanks to the broad introduction of the experience of senior roller Comrade Shestopalov, labor productivity per rolling-mill hour increased by 1.02 percent and the current norms of roll changing time and of transition time shrank by 13 percent.

For every measure to be introduced a specific deadline is fixed and the responsible individual is named. Of the 112 labor-saving suggestions submitted recently, 94 were adopted.

Technical-economic conferences are an effective form of mobilizing the workers to introduce new equipment, uncover

new production potential, and better utilize equipment. They enable the personnel to solve the urgent problems of technical progress. The conferences held during the present year outlined 77 measures whose adoption has been tentatively calculated to yield more than three million rubles in savings by 1965.

It must be stated, however, that the problems of modernizing and renovating individual units of equipment are not always being solved from the standpoint of the over-all future development of the entire plant and of the experience of other enterprises. This occasionally leads to an incomplete utilization of the existing production potential, to disproportions in the development of capacities on individual sectors.

Certain shops are not satisfactorily fulfilling important measures with respect to new equipment, mechanization and automation, and improvement of working conditions. The automation of the heat regime at the new open-hearth furnace, for example, lags behind schedule. The complex mechanization of the preparation and delivery of materials to open-hearth furnaces and ladles, and also the loading, unloading, and transportation of refractories in the storage area, are not being completed on schedule. The Party committee has repeatedly discussed these problems without accomplishing their complete solution.

All this demands of us a more persistent improvement of the forms and methods of Party control over the implementation of measures to accelerate technical progress. Comrade Nikita S. Khrushchev stated in his report to the November Plenum of the Party CC that: "Technical progress is that key outpost with whose aid we can solve the tasks of creating the material-technical base of communism and attaining a high labor productivity."

To conquer this key outpost we must still more persistently strive to increase the responsibility of the managers and all blue- and white-collar workers for the introduction of the latest achievements of science and engineering and advanced know-how.

## NEW TUBE MILL AT THE PERVOURAL'SK TUBE PLANT

[Following is a translation of an article by F. Danilov, Director, Pervoural'sk Tube Plant, in the Russian-language newspaper Ekonomicheskaya Gazeta (Economic Gazette), Moscow, No 49, 1 Dec 62, p 12.]

Recently the nation's first continuous tube rolling mill was approved for operation at the Pervoural'sk Tube Plant, following broad tests by a commission of the All-Russian Sovnarkhoz. This is a most up-to-date highly mechanized giant-capacity mill. It can roll tubes with diameters of from 29 to 102 millimeters at the rate of 12 meters per second! These tubes are in great demand among the various branches of the national economy.

The following article by the director of this plant, Comrade Danilov, describes this unique tube mill and how its full designed capacity is being attained.

\* \* \*

The design of the "30-102" mill and the process by which it manufactures tubes are fundamentally innovations in the practice of the domestic metallurgy. Some of the technical solutions they embody have no equals in foreign tube manufacturing practice as well.

The new tube mill displays major advantages over its previous counterparts. It is adapted for the mechanization and automation of the entire process of tube manufacture, beginning with the heating of the skelp and ending with the trimming of the tube.

The shop for the continuous rolling of seamless tubes and its equipment were designed in creative collaboration

with several scientific research institutes, design organizations, and machine-building plants. This includes such institutes as: the All-Union Institute of Metallurgical Machine Building, the Gipromez, the Institute of High-Frequency Currents imeni Professor Vologdin, the Uralgipromez, and Tayzhpromelektroproyekt of the Ministry of Construction RSFSR, and others.

A total of 248 plants produced the equipment for this shop. The largest part was provided by the Elektrostal' Heavy Machine Building Plant.

The prime contractor was the Uralt'yazhtrubstroy Construction Trust. Together with the installation and adjustment organizations it carried out an impressive volume of operations. Suffice it to mention that 16,000 tons of production equipment were installed in the shop, as were 237 kilometers of piping. The length of the wiring and cables reaches nearly one million kilometers. Installed in the building were 4,700 electric motors with an aggregate rating of 108,000 kilowatts, as well as 1,100 different magnetic units and control boards and panels.

The workers of our plant prepared themselves in advance to handle the new intricate equipment. The main nucleus of the shop personnel was created long before the activation of the shop. Tube-rolling engineers and workers labored jointly with the builders and installers, attended production-technical courses, and underwent practice training in existing shops.

On 25 January 1962 the first finished tube was produced. In March the shop produced several thousand tons of tubes. As the equipment became gradually mastered and stoppages diminished and the skills of the rollers increased, the tube output started to grow. In the initial period, tens and hundreds of workers, engineers, and technicians distinguished themselves in mastering the mill. Examples of truly creative labor were provided by the rollers Comrades Reutov, Voroshilov, Suvorov, and Popov; the welders Comrades Temnikov and Mochalov; the fitters Comrades Bragin, Fedorishchev, and Gaydukov; the electricians Comrades Izmaylov and Tokarev, and many others. The engineers from the technical department and laboratory, Comrades Kaufman, Kukarskiy, Gleyberg, Stoletniy, and others, contributed their knowledge and experience to the cause of mastering the use of the new equipment.

As they say, a large ship sails over large distances. Our tube production is still small, however, as compared with the full designed capacity of the mill, which definitely must be attained more rapidly.

In the first few months of operation various shortcomings in the design of the components and subassemblies of the mill have been revealed. Therefore, we encountered substantial difficulties in mastering the mill. Their surmounting involves changes in technological parameters and the design modifications of certain machines and mechanisms while in operation. Workers from several scientific-research and design institutes are aiding the plant specialists to master the facilities of this unique tube mill.

It must be stated that in the process of designing the mill, constructing its equipment and, now, mastering its operation, we have felt and are feeling acutely the shortcomings in the field of project-design work which Comrade Khrushchev criticized in his report at the November Plenum of the CC CPSU. All in all, 41 scientific-research and design organizations participated in building this shop. They often operated without mutual cooperation and coordination, and their activities were not markedly purposive.

Research work was not always performed operatively and rapidly, and the technical solutions were not adopted as rapidly as the situation required and requires. The workers of the All-Union Scientific Research Institute of Metallurgical Machine Building, in our opinion, have protracted the research in the power and kinematic conditions of rolling tubes in a sinking mill. The problem of the automatic control of the heating of tubes by high-frequency currents is being solved very sluggishly by the Scientific Research Institute imeni Professor Vologdin.

The continuous tube mill has various defects. The greatest attention should be paid to eliminating these, as the periods of elimination of wrong design and research solutions pre-determine the period of attaining the full designed capacity of the shop.

The sectional high-speed reheating furnaces must be fundamentally altered. Such problems as a reliable elimination of scale from the tambours ["tambury"] and sections of the furnaces, and the increase in the recuperator draft still have not been solved. And without their solution a sufficient furnace productivity cannot be achieved.

The sinking mills operate unsatisfactorily. They often have to be shut down. The operating reliability of the differential-group drive of these mills is low. This is because the drive was shoddily constructed, and the torques proved to be higher than calculated. Errors were committed in designing and constructing the tube shearing devices.

The institutes of the State Committee for Automation and Machine Building failed to assure the design and construction of efficient means for the automatic quality control of finished tubes. Meanwhile a large number of workers has to be occupied with quality control, as the automatic means have not been put into operation.

The experience in the activation and initial operation of this latest tube mill, the "30-102," suggests definite conclusions which should be considered for the future.

The design of the sectional reheating furnace proved to be infelicitous, as it was developed by uninformed persons. The point is that we lack a specialized organization for designing reheating and heat-treating furnaces for the tube industry. The designer of this equipment -- the Moscow Branch of the Gipromez -- lacks scientific-research facilities for preliminary trials and modifications of the design of the furnaces before introducing them in tested form into industry. It is patently obvious to us that a special furnace building firm should be established. It should be provided with every facility and condition for testing the ideas of designers. This firm, in our opinion, should be charged with the design, delivery, installation, adjustment, and transfer in fully prepared condition of reheating and heat-treatment furnaces to the customers.

This pertains just as well to the devices for automatic quality flow control of finished production. The failure in developing these devices for us, ferrous-metallurgy enterprises, is in our opinion to be explained by the fact that the State Committee for Automation and Machine Building did not consider this task seriously, believing that it could be solved "among other things." The intricate task was entrusted to a laboratory which clearly proved to be unable to cope with it.

The State Committee for Automation and Machine Building should draw practical conclusions from this lesson. After all, not only our own plant but also other ferrous-metallurgy enterprises stand in urgent need of automatic quality control instruments.

At present at the tube plant five to eight percent of personnel are occupied with quality control duties. Considering, moreover, that this quality control is performed subjectively and therefore with occasional errors, the present situation cannot be considered normal. It is our deep conviction that the need is ripe to establish a special institute for the design and development of automatic quality control instruments for the metallurgical industry.

In our opinion it is not normal that the expenditures on adjusting production equipment and processes are not being included in the production cost of the enterprise where the new capacities are being introduced. Incidentally these expenditures are the greater the more intricate is the production equipment and process. These expenditures (and their extent is extremely substantial) were very difficult to calculate when planning the tasks as to production cost for our plant. As a result, the plant underfulfilled the plan for this important index, with all the consequences ensuing therefrom. The engineers, technicians, and workers at the auxiliary shops received no bonuses for many months.

It would seem that the solution of complicated tasks of introduction of new equipment (such as are precisely being solved at our plant) should be properly encouraged by material incentives. The actual picture, however, is just the opposite. We believe that all the expenditures on adjustments of the production process and equipment should be taken into account in the estimates of capital construction rather than in production cost, where they distort this cost.

Yet another conclusion is suggested by the lessons of the activation and mastering of the new jnique tube mill. To eliminate as soon as possible the mistaken solutions and remedy the defects of the equipment, special start-up and adjustment brigades should be established. Their membership must necessarily include qualified representatives from the main institutes and machine building plants, endowed with appropriate privileges. Such a brigade should be headed by a competent leader whose orders and directives should be binding to all of its members.

The experience in starting-up the continuous tube shop convinces us of the justice of our proposals.

At present the maximum effort should be focused on attaining the full designed capacity of the "30-102" mill.

This task should be solved by our plant in collaboration with the designers and machine builders -- the suppliers of the equipment. They must be permeated by the feeling of a deep responsibility for this matter.

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## INEFFICIENT OPERATION OF MACHINE TOOLS IN THE INDUSTRIAL ENTERPRISES OF THE DONETSKIY SOVNARKHOZ

[Following is a translation of an unsigned article in the Russian-language newspaper Ekonomicheskaya Gazeta (Economic Gazette), Moscow, No 49, 1 Dec 62, p 33.]

The five-day public inspection began with the largest enterprise in Konstantinovka -- the Metallurgical Plant imeni Frunze. It operates more than 100 units of metal-cutting equipment. But of its 40 lathes only the 12 at the machine shop operate on a three-shift basis. The others work only a single shift daily. Most of these are the largest lathes, designed to machine important parts.

The members of the inspection team asked a mechanic at the foundry and machine shop, B. Tivirovskiy: "Why are the machine tools so under-utilized? Could it be that there are not enough orders?"

"There are more than enough orders. We even transfer some to other plants. It is the number of machine-tool operators that is insufficient. That's why."

"So why don't you hire more?"

"We would, gladly, but the heads of the enterprise are opposed to this, considering it expedient. After all, machine-tool operators produce neither steel nor rolled stock."

That is why in September six lathes idled for 509 hours. This is equal to more than 70 shifts! The capacity of the metal-cutting equipment at the open-hearth, coke-chemical, and other shops of this enterprise was less than half utilized.

The chief of the repair bureau, Aleksandr Ivanovich Khalin, said: "Why not gather together all these machine tools on a single spot?"

"Yes, why not indeed?"

"We tried, but not one shop chief had agreed. They act on the principle of 'though not the best, it is our own,' and the management supports them."

Some machine-tool operators here lubricate cutting tools with an emulsion of... ordinary lubricating oil. We became intrigued in this odd mechanization. It turned out that 18 months ago five electric motors of cutting-tool cooling pumps were sent for repair to the Donetsk Power Plant and still have not returned. The director of this enterprise, K. Golyak, always replies with promises: "Wait. We'll send them."

From the Plant imeni Frunze the inspection brigade went to the "Utyazhelitel'," a small plant also belonging to the Metallurgical Administration at the Donetskoy Sovnarkhoz. Here, too, a machine shop exists. And although it contains only two lathes, one planning machine, and two drilling machines, this does not face the management. The argument here is the same: "Though not the best, it is our own."

We talked to the chief mechanic L. P. Domashchenko.

He said: "Although our shop is called a repair base, I spend the entire day on placing orders with outside outfits. Now, if only the sovnarkhoz could establish its own branch or inter-branch plant for the repair of technological and nonstandard equipment, the picture would be totally different."

And how is metal-cutting equipment being utilized at the Glass Products Plant? Poorly. Judge for yourselves: it operates not more than seven to ten hours daily. There is no third shift there. And machine tools are being idled instead of being used to manufacture hundreds of different components for the glassware enterprises.

The same, if not worse, situation reigns at the Chemical Plant, where 19 machine tools are operated. On the average they are operated at only 35 percent capacity. Many of them are thoroughly worn out for having not been overhauled for a long time. What can be done about all this?

Here is what is proposed, for example, by the chief of the Administration of Chemical Industry at the Sovnarkhoz of the Donetsk Economic Region, M. Tsarev. His order states literally: "Achieve the organization of the centralized repair of metal-cutting machine tools, through the energomechanical administration at the sovnarkhoz." The only unclear thing is: who should achieve this?

At the repair and machine shop of the Zinc Plant, of its 23 machine tools, only 12 are operated for two shifts. The others operate only for a single shift. The shop lacks enough lathe operators. As it happens, there are more than enough lathe operators at this plant. The lathe operators M. Shkol'nikov and L. Grin' work as fitters, and A. Sushchev has become an assistant apparatus operator. The machine-tool operators N. Bychkov, M. Peresypkin, and N. Sergiyenko left for other plants. Why? Because of the lack of opportunities for promotion. No matter how long and how well a lathe operator works at this plant, he cannot be promoted beyond category 6.

Two figures follow. In September all the machine tools at the machine and repair shop operated for 4,339 hours and idled for 2,288 hours.

A similar situation reigns at the Krasnyy Oktyabr' Refractories Plant. Of its 29 metal-cutting machines only eight to 10 operate for two shifts. As a rule, the turret lathes, gear-milling, radial-drilling, coarse-grinding, and other machine tools stand idle from 1500 hours till dawn.

Take for example the DIP-400 lathe. You are hardly likely to encounter it at many plants. But even so, here it is operated for a single shift only. There is no one to tend it during the second shift. It is no problem to find another lathe operator, but no one is concerned with it. It is much more simple to have the sovnarkhoz transfer orders to another plant. This in particular happened with the machining of crusher shafts. It was decided that this was too much bother and so the order was reassigned to the repair and machine shop at the Zinc Plant, although its shaft-machining tool is worse than that of the Krasnyy Oktyabr' Plant; it was built in... the year 1887.

"Why should we do it. Let's better transfer it to our neighbors. We'll find an easier assignment for ourselves." Now, this reasoning is not limited to this plant alone.

The repair services at the Konstantinovka Plant do not keep pace with the growth of basic production. In almost every case the repair facilities are obsolete. A majority of the machine tools are of prewar vintage.

The Director of the Krasnaya Zvezda Chamotte Plant, N. Nuzhnyy, said: "In the last five years our volume of output has doubled while the machine shop was complemented by only one additional machine tool, and its personnel was increased by 1.5 percent. We have only 19 machine-tool operators for our 13 machine tools. Our auxiliary services do not keep pace with the dynamic growth of basic production. I'm firmly convinced that large united plants for the repair and production of nonstandard equipment are needed, rather than repair shops."

Elaborating on this idea, Comrade Nuzhnyy declared that it would be nice to have such an enterprise for servicing the needs of all the refractories plants of the Donets Basin. This is additionally necessary considering that about one-third of the entire personnel of the refractories enterprises is employed in the repair services.

But what is better: an inter-branch repair plant or large branch repair bases? The administrators are in favor of the latter. At the same time they consider it mandatory for every enterprise to have at its own disposal a minimal number of metal-cutting machine tools.

It must be noted that the Donetskii Sovnarkhoz has a dim idea as to the machine-tool pool of its non-machine-building enterprises. This pool happens to be extensive. In Konstantinovka alone there are more than 300 units of metal-cutting equipment. Some of them can doubtless be used to establish the inter-branch repair base.

## IMPROVE THE OPERATING EFFICIENCY OF METALLURGICAL ENTERPRISES

[Following is a translation of an article by I. Dubson in the Russian-language newspaper Ekonomicheskaya Gazeta (Economic Gazette), Moscow, No 49, 1 Dec 62, p 34.]

The solution of the paramount economic goal of the Soviet nation -- the creation of the material-technical base of communism -- depends enormously on the maximally rapid activation of new production capacities.

Tens and hundreds of giant and modernly equipped enterprises of the metallurgical and chemical industry are annually put into operation in this country. However, the attainment of their full designed capacity sometimes takes many years and the funds invested in their construction and equipping sometimes do not pay off properly.

A major reason lies in the improper planning of construction. In 1951, for example, the "2300" mill was built and put into operation at the Chelyabinsk Metallurgical Plant. It operates at only half-capacity. The problem is that the construction of the blooming mill that was to supply this mill with billets has not yet been started. The billets have to be brought in from other metallurgical enterprises. In addition, there also are delays in building the "1700" line and the skelp cutting department, which are a continuation of the "2300" mill. As a result, the plant incurs considerable expenses on the transport of billets and the dispatching of unfinished rolled stock for further processing, mainly due to the underutilization of the capacity of the "2300" mill.

Incorrect planning of the construction of metallurgical enterprises causes the completed projects for a long time to

operate at partial capacity also due to the lag in the construction of allied projects.

Thus, the Novo-Tula Metallurgical Plant built a new large-capacity blast furnace, as a result more than doubling its demand for sinter. However, the problems of supplying sinter to the blast-furnace shop were not considered in advance. It was only recently that a sintering factory began to be built.

For this reason alone the Novo-Tula Plant has been annually under-producing hundreds of tons of pig iron, and the volumetric efficiency of its blast furnaces has been 0.955 instead of the feasible 0.775. It is easy to calculate the losses suffered by the plant. In the first nine months of 1962 they cost the State 10 million rubles.

...The enterprises of the Chelyabinskiy Sovnarkhoz annually dump more than three million tons of molten slags. The Magnitogorsk Combine alone expends as many as three million rubles annually on slag dumping whereas a standard slag-retreating installation costs approximately 800,000 rubles.

The same situation reigns at the metallurgical enterprises in Tula, Orenburg, Kuznetsk, Serov, Verkhnyaya Salda, Zhdanov, Donetsk, Lugansk, Dnepropetrovsk, and Krivoy Rog. At the enterprises investigated by the Stroybank USSR it was found that more than 40 percent of slags is dumped at an average cost of 33 kopecks per ton annually....

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